Lab#04 Tasks

Consider the following data for the next several questions:

```
.data
vall BYTE 10h
va12 WORD 8000h
val3 DWORD 0FFFFh
va14 WORD 7FFFh
```

1. Write an instruction that increments val2.
2. Write an instruction that subtracts val3 from EAX.
3. Write one or more instructions that subtract val4 from val2.
4. If val2 is incremented by 1 using the ADD instruction, what will be the values of the Carry and Sign flags?
5. If val4 is incremented by 1 using the ADD instruction, what will be the values of the Overflow and Sign flags?
6. Where indicated, write down the values of the Carry, Sign, Zero, and Overflow flags after each instruction has executed:

```
mov ax, 7FF0h
add al, 10h         a. CF=?  SF=?  ZF=?  OF=?
add ah,1            b. CF=?  SF=?  ZF=?  OF=?
add aX,2            c. CF=?  SF=?  ZF=?  OF=?
```

7. Implement the following expression in assembly language: AX = (-val2 + BX) - va14.

Carry Flag

Write a program that uses addition and subtraction to set and clear the Carry flag. After each instruction insert the call DumpRegs statement to display the registers and flags. Using comments, explain how (and why) the Carry flag was affected by each instruction.

INC and DEC

Write a short program demonstrating that the INC and DEC instructions do not affect the Carry flag.

Zero and Sign Flags

Write a program that uses addition and subtraction to set and clear the Zero and Sign flags. After each addition or subtraction instruction insert the call DumpRegs statement to display the registers and flags. Using comments, explain how (and why) the Zero and Sign flags were affected by each instruction.

Overflow Flag

Write a program that uses addition and subtraction to set and clear the Overflow flag. After each addition or subtraction instruction, insert the call DumpRegs statement to display the registers and flags. Using comments explain how (and why) the Overflow flag was affected by each instruction.

Include an ADD instruction that sets both the Carry and Overflow flags. (can it be done?)

Direct-Offset Addressing

Insert the following variables in your program:

```
.data
Uarray WORD 1000h,2000h,3000h,4000h
Sarray SWORD -1,-2,-3,-4
```

Write instructions that use direct-offset addressing to move the four values in Uarray to the EAX, EBX, ECX, and EDX registers. When you follow this with a call DumpRegs statement, the following register values should display:

```
EAX=00001000 EBX=00002000 ECX=00003000 EDX=00004000
```

Next, write instructions that use direct-offset addressing to move the four values in Sarray to the EAX, EBX, ECX, and EDX registers. When you follow this with a call DumpRegs statement, the following register values should display:

```
EAX=FFFFFFFF EBX=FFFFFFFE ECX=FFFFFFFD EDX=FFFFFFFC
```

Explain each output